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Reasons for transition to open surgery in laparoscopic cholecystectomy

Cholecystectocmy

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Abstract
Aim: Laparoscopic cholecystectomy is a minimally invasive surgical technique that has become widespread since the 1980s. Many factors are effective in the conversion to open surgery. This study aimed to investigate the rates and reasons for the conversion to open in laparoscopic cholecystectomy surgeries in our hospital.
Material and Methods: This study aimed to examine 3263 cholecystectomy cases with the conversion to open during surgery between June 2014 and June 2019. Patients were examined in terms of age, sex, comorbidities, acute cholecystitis attack status, previous surgery, adhesion, gallbladder wall thickness, revealing surgical anatomical structure, surgical complications, length of hospital stay, and mortality. The results were evaluated statistically.
Results: Data of 70 patients, who were performed laparoscopic cholecystectomy with the conversion to open surgery during the procedure, were reviewed. The conversion rate was 2.3%. Among the patients, 28 were female and 42 were male. Sixty-two of the patients had an episode of acute cholecystitis. The most common reason for the conversion was that the anatomy could not be revealed.
Discussion: It should be kept in mind that laparoscopic cholecystectomy surgery, which is interpreted as a simple surgical procedure, can always be converted to an open surgery and there may be vital complications.

Keywords
Laparoscopic cholecystectomy; Complication; Conversion to open

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Introduction

Laparoscopic cholecystectomy is a minimally invasive surgical technique that has become widespread since the 1980s. Today, it is one of the most commonly used intraabdominal laparoscopic surgeries [1]. Ninety percent of cholecystectomies are performed by the laparoscopic technique. Laparoscopic cholecystectomy is superior to open cholecystectomy in benign symptomatic gallbladder diseases due to less postoperative pain, shorter hospital stay, shorter recovery, and better cosmetic results [2]. The aim of the conversion from laparoscopic to open surgery is to eliminate, or at least reduce, surgical complications. Laparoscopic cholecystectomy has a higher complication rate than open cholecystectomy [3,4]. However, recently, open cholecystectomy complications have been increasing due to the decrease in open cholecystectomy experience and complicated cases that are not performed by the open method [5-7]. The conversion rate to the open method is 9.5% [5]. Many factors affect the conversion to open surgery. These include age, gender, emergency surgery and previous surgery-related adhesions [6]. This study aimed to investigate the rates and reasons for the conversion to open in laparoscopic surgery in our hospital, in the light of the literature.

Material and Methods

We investigated the results of cases with the conversion to open surgery in laparoscopic cholecystectomies in our hospital. The study was designed retrospectively. Local ethics committee approval was received for the study. Patients who underwent cholecystectomy for symptomatic benign gallbladder diseases other than malignant diseases were included in the study. Patients were examined in terms of age, sex, obesity, comorbidities, acute cholecystitis attack status, adhesion, gallbladder wall thickness, endoscopic biliary tract interventions, previous surgery, revealing surgical anatomical structure, surgical complications, length of hospital stay and mortality. Patients with a gallbladder wall thickness of 4 mm or more, increased white blood cell count and right upper quadrant tenderness were evaluated as acute cholecystitis. The study was conducted according to the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study.

Statistical Analysis

Social Science Statistical Package (SPSS Inc., Chicago, IL, USA) software was used for bio-statistical analysis. When data were presented as mean values, the standard deviation values were given, and when they were presented as mean values, the minimum (min) -maximum (max) values were indicated.

Results

The records of 3263 patients who underwent cholecystectomy were reviewed retrospectively, and 263 patients who underwent open surgery were identified. The rate of open cholecystectomy was 8%. Seventy (26.6%) of the open cholecystectomies were started laparoscopically. The study was conducted on 70 patients. The rate of conversion from laparoscopy to open surgery was 2.3%. Twenty-eight (40%) of the patients were female and 42 (60%) were male. The mean age was 55 (18-82) years for males and 42 (18-84) years for females. The body mass index (BMI) was 30.1 in men and 32.2 in women (Table 1). Among the cases with chronic diseases, Diabetes Mellitus was present in 14 (20%), hypertension in 29 (41.4%), chronic liver disease in 8 (11.4%), chronic lung disease in 4 (5.7%) and neurological disorders in 4 (5.7%) patients. Sixty-two patients (88.6%) had a previous episode of acute cholecystitis attack and were hospitalized. The mean interval between operation and first acute attack was 3.5 (1-18) months. Seventeen (24.3%) of the cases, underwent lower abdominal surgery and 15 (21.1%) underwent upper abdominal surgery. Grade 1-2 adhesions were observed in patients who underwent lower abdominal surgery, whereas grade 2-3 adhesions were observed in those who underwent upper abdominal surgery (8). In pericholecystic adhesion cases, 56 (80%) patients were observed to have omentum and peripheral organ adhesions. Seven patients had only omental adhesions.

The endoscopic biliary intervention was performed in 50 patients (71.4%) before surgery. Among the reasons for convertion, the anatomy could not be revealed in 46 (65.7%) while 11 (15.7%) had Mirizzi syndrome, 4 (5.7%) were with bleeding, 4 (5.7%) had a cholecystoenteric fistula, 3 (4.3%) were with suspected malignancy, and bile was coming from the gallbladder bed in 2 (2.9%) (Table 2). The mean hospital stay was 8.6 (3-31) days. Mortality was seen in 2 (2.9%) cases due to respiratory failure on postoperative 4th and 20th days.

In 49 (70%) patients, chronic cholecystitis was present histopathologically. In 59 (84.3%) cases, gallbladder wall thickening observed during surgery was confirmed histopathologically.

Table 1. Clinical and Demographic data

Parameters	Value
Age	
Female	42 (18-84) (year)
Male	55 (18-82) (year)
Gender	
Female	28 (%40)
Male	42 (%60)
Body mass index (BMI)	
Female	32.2
Male	30.1
Number of patients converted to open	70
Endoscopic biliary tract intervention patients number	50 (%71.4)
The mean interval between operation and first acute attack	3,5 (1-18) month
The mean hospital stay	8.6 (3-31) days

Table 2. Reasons for open surgery conversion

Parameters	Patients (n, %)
The anatomy could not be revealed	46 (65.7%)
Mirizzi syndrome	11 (15.7%)
Bleeding	4 (5.7%)
Cholecystoenteric fistula	4 (5.7%)
Malignancy	3 (4.3%)
Luschka	2 (2.9%)

Discussion

Laparoscopic cholecystectomy is currently the gold standard method in gallbladder surgery. This common surgical procedure has its specific complications. When a problem is encountered during a laparoscopic cholecystectomy, it is necessary to proceed to a safer open procedure [2]. The rate of conversion to the open procedure is between 6.3-9.5% [5, 9]. As the surgical experience increases, the complication of laparoscopic surgery [10] and biliary injury decreases. Our ratio is much lower than this value and is 2.3%. We think that this is due to an experienced surgical team and surgical equipment with good-quality. Another reason for this is that we perform surgery in all acute cholecystitis cases before the 48th hour in men and before 72nd hour in women. We give priority medical treatment to patients who apply late.

In laparoscopic cholecystectomy, many factors are effective in the conversion to open. The most important of these factors is the lack of anatomical structure reveal [11]. The most important factors that disrupt the anatomical structure are adhesions due to previous surgery and acute and chronic cholecystitis. Surgery is more difficult in patients who underwent endoscopic retrograde cholangiopancreatography [12]. The reason for this is not fully enlightened. Endoscopic intervention cases are complicated cases. Previous endoscopic interventions increase pericholecystic fibrosis and possibly disrupt the anatomical structure. Adhesions formed in the calot triangle make surgical dissection difficult [13]. Bleeding in this area makes dissection more complicated. In our experience, the most important reason for the conversion is when the anatomical structure cannot be revealed; when the distinction between the cystic duct and the common bile duct cannot be made completely. The idea of injury to the biliary tract is important in the conversion to open. Fibrosis in the dissection area during surgery makes the surgery and the differentiation of anatomical structures more difficult. Adhesions resulting from previous surgery make laparoscopic surgery more difficult. This causes problems during the trocar entry. This leads to prolonged surgery and damage to organs other than the gallbladder. Male gender and advanced age were found to be effective in the conversion to open [11]. It was stated that estrogen is effective in this situation [14]. Difference in terms of anatomical structures, dietary habits, and response to inflammation between the two sexes have been reported to be effective. According to our data, it was determined that there was a greater conversion rate in the male gender. However, we did not obtain any data on advanced age. It is known that previous surgeries can cause a conversion to open surgery. However, it is known that this complicates the whole laparoscopic surgery and is not only specific to gall bladder surgery. In particular, this makes it difficult to reach the gallbladder region in upper abdominal surgery.

The surgical experience is effective in the conversion to open. After the first 200 cases, there is a serious decrease in the conversion to open [15]. The learning curve of laparoscopic cholecystectomy is between 10 and 50 [16]. Experienced surgeons perform more complicated laparoscopic surgeries with fewer complications. Since the operations performed by experienced surgeons were examined in our study, the rate of conversion to open surgery was much lower than in the literature. Many complications during operation are overcome by laparoscopic surgery.

Biliary system injuries during surgery are seen at a rate of 0.4% to 0.6% [17]. This ratio is higher than with open cholecystectomy. Injury may be noticed during laparoscopic cholecystectomy or in the postoperative period. Another complication seen during the operation is vascular and intestinal injuries. The injury rate is between 0.14% and 0.25%. Intestinal injuries are usually caused due to adhesion and can be repaired laparoscopically. However, in cases in which anatomy cannot be revealed, the injury is large and intraabdominal contamination is present, the conversion to open surgery is safer. In our cases, there was no conversion to open surgery due to intestinal injury. However, due to a cholecystoenteric fistula, 4 patients required conversion to open. The patient was switched to open surgery due to severe bleeding. Hepatic artery injury occurred in 1 of these cases and repaired with open surgery. Other bleedings occurred in the gallbladder bed. None of the bleedings resulted in death.

Conclusion

It should be kept in mind that laparoscopic cholecystectomy surgery, which is interpreted as a simple surgical procedure, can always be a conversion to open surgery, and there may be vital complications. The rate of conversion to open in laparoscopic surgery depends on the surgical experience. For inexperienced centers, this rate is very low, but can never be completely zeroized.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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